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AUTHOR Minor, Frank J.
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ABSTRACT

The actual workings of the Educational and Career Exploration System (ECES) are described. The functions of the system are divided into three general phases: (1) an occupational information bank for exploring occupations; (2) an educational information bank for exploring training programs and educational areas of study; and (3) a junior college/senior college information bank for isolating the names of appropriate post-high school institutions. The multiple steps for the student, in his interaction with the computer, are spelled out. The flexibility of the system is stressed as being dependent on the student's immediate needs and his judged level of vocational maturity. The system was field tested in Montclair High School in New Jersey. On the basis of the findings, revisions were made which will be tested in the Genesee Intermediate School District in Flint, Michigan. The paper concludes with a brief assessment of the advantages which ECES can provide to the student, the counselor and the school. [Not available in hard copy due to marginal legibility of original document.] (TL)

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Frank J. Minor

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A COMPUTER BASED EDUCATIONAL AND CAREER EXPLORATION SYSTEM

In January of 1966, we started to develop the ECES system and after three years of work we completed our first version which we submitted to a field test in Mnntclair N.J. High School. We spent the first year planning the system functions to be performed, deciding upon the contents to be stored in the information banks, designing the user strategy, and the allocation of roles between the client, the counselor, and the computer. We spent the second year building and pilot testing a variety of prototype versions. Based upon what we learned in these pilot tests, we decided upon a detailed set of systems specifications. In the third year we built a complete system to these specifications. The system passed through a field test in Montclair High School in New Jersey in the spring semester of 1969. We will describe the results of the field test in a few moments. I will now describe to you how the system works.

(Slide #1 Picture of Terminal)

To use the system the student is seated at a "terminal" which is connected to a computer by means of telephone lines. The student carries on conversation or interacts with the computer by using the terminal in the following manner:

a) There is a film image screen which, under the control of either the computer or the student, will show him vocational and educational information and also questions which he must answer.

b) The questions are in multiple choice form and the student responds to them by pressing keys on a keyboard located directly below the film image screen.

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c) Based on the student's responses, the computer branches or selects the next appropriate film frame that the student will read.

d) There is also a typewriter printer which under computer control will print personalized messages for the student.

As I describe how the system operates, I will show you samples of the kinds of information the student will see on the film image screen and the kinds of reports printed by the typewriter.

There may be hundreds of terminals connected to a single computer and they can all be used simulatneously. Each terminal may be located at a different school site hundreds of miles away from the computer. In our field test we had 4 terminals in Montclair High School in New Jersey and our computer was located about 100 miles away in the state of New York.

The functions of the system are divided into three general phases. Associated with each phase is a computer-based information bank. There is an occupational information bank which the student uses for exploring occupations. There is an educational information bank that the student uses for exploring training programs and educational areas of study. There is a junior-college and senior-college information bank which the student uses for isolating the names of post-high school institutions that best satisfy his educational and vocational goal and his personal preferences. The flexibility of the system allows the counselor to help the student enter initially at any one of the three phases depending upon the student's immediate needs and his judged level of vocational maturity. There are linkages by which the student can move freely among the phases as best fits his current exploratory mood, the changes in his educational and vocational maturity level, and his need to find clarification for issues that did not concern him earlier.

For each student there is stored in the computer a school data profile and a self-description profile. The system will, under the control of the student, relate his profiles to the educational and occupational information. In this way, each student's conversational experience on the system is fitted to his individual needs.

(Slide # 2 - Flow Chart: School Enters Data-Starting Point)

Allow me to become more specific now. For each student the school enters a data profile. The profile consists of a list of all the courses the student has completed, the grades he received in those courses, the results of a general learning ability test, and the results of an interest inventory.

Before a student uses the system he and the counselor decide where the student should enter into the system. There are three starting points. The student can start by exploring occupations, or by exploring post high school major areas of study, or by searching for an ecucational institution which will satisfy his vocational goals.

Let's tract throuch the system now, assuming a student will use all three of the operations I just named.

(Slide #3 - Flow Chart: Self-Description-Comparison chart)

The student starts out by entering into the system a self-description in which he has estimated his learning ability in verbal, mathematical and scientific areas. The computer analyzes his responses and computes a composite estimate for him. The student also estimates the strength of his interests in 8 major occupational fields. The student does this by comparing himself to other

occupational fields. The student does this by comparing himself to other students. The school has previously entered data into the computer about each student. This includes:

a. The courses he has taken and his grades,

b. The results of a general learning ability test,

c. The results of an interest inventory,

The computer then makes a comparison between the school data and the student's self-description and displays this to the student in the form of a printed report. It is intended that the student use this report as a springboard for thinking about the differences and the possible implications for his educational and vocational plans. He should discuss the differences with his counselor.

(Slide #4 Flim Image Frame)

Here you see an example of the kind of question the student sees on the film image screen when he was estimating his general learning ability. He responds to the question by pressing the key below the film image screen on the terminal.

(Slide #5 Print out)

Here is an example of the kind of printed report a student receives from the typewriter that shows him how his self-description compares with the school data.

As the student uses the system, this self-description as well as the school data profile, will serve as a means of giving the student personalized feedback from the computer as he explores different occupational and educational areas. I

think it's important to point out here also that the student has the freedom to change his self-description stored in the system as he learns more about occupations, educational paths and about himself.

(Slide #6 Flow Chart: Vocational Exploration-Browsing)

Assume that the student would prefer to "browse" through occupations before performing a detailed analysis of occupations. He does this by indicating to the system his personal preferences for:

a. Working with people, data or things. And..

b. The kind of work conditions that are most appealing to him.

On the basis of this information, the computer searches through a data base of approximately 1600 occupations to isolate occupational categories that come closest to meeting the student's preferences. The system prints for the student a listing of these categories and is referred to brief descriptions of each occupation in these categories.

(Slide #7 - Browse Print-out)

Here is an example of the kind of listing the student gets from the typewriter. He then finds in a book which we have provided for him, the names and definitions of the occupations which fall into these categories.

The student can use this browsing data base over and over again to either:

a. Expand his list by liberalizing some of his preferences, or

b. Shortening the list by being more discriminating.

The student is encouraged to take the printed browse list home. Hopefully, he

will delete some occupations, add others and finally produce a residual list of tentative occupational goals.

(Slide #8-Flow Chart: Names occupations of interest-vocational Exploration Cont')

After browsing, the student returns to the system and enters the names of occupations that he would like to consider as possible goals.

When the student enters the names of these occupations, the typewriter responds with feedback information about;

1. The compatibility of these occupations with his school record data and his self-concept profile,.and...
2. The names of other occupational groups that he made no mention of but are compatible with his profiles.

(Slide #9-Print out of occupations named and wisdom of choice)

Here is an example of a typewriter message to the student which shows him how the occupations he said were of interest to him are related to his school records.

? = means there may be a problem area and he should see his counselor.

if he considers occupations that require college education and his scholastic record falls below the critical cut-off score a ? will be printed.

, on the other hand, if his general learning ability score and his scholastic record are high and he is looking at occupations below his potential a ? is printed to remind him that he might be under-extending his abilities..

, ? will also be typed if the student's interest inventory score was

low for the field in which the occupation is classified.

- The system is designed sothat the cut-off scores for scholastic record and the general learning ability test can be adjusted by the user school guidance counselors to suit changing acceptance policies and the experience of the high school using the system

By going through the exercises just described, we hope that the student's perception of the world of work will have been broadened and that he understands his multipotentiality and also is in a position to selectively reduce the alternatives available to him.

(Slide # 10- Flow Chart: Detailed Analysis of an Occupation)

Assume now that the student wishes to analyze in more depth one or more occupations that are of particular interest to him. He does this by entering the name of the occupation into the system. There are 350 occupations he can analyze in depth. They are categorized into 4 levels of educational requirements and 8 fields of activity. He learns about the nature of the work for an occupation by engaging in a work sample and reviewing the duties performed while seated at the computer terminal.

(Slide # 11- Work Sample)

The work sample is a series of short problem solving situations intended to give the student a feeling for the nature of the work. The work sample is intended to be a games playing situation where the student is asked to play the role of the person in the occupation He enters his answers to questions by pressing a key on the keyboard. The computer tells him whether his responses were right or wrong and "why". The work sample is not designed to be a test, but a game and a learning experience As he reviews the duties performed, he responds to questions such as:

Does he think he would like the kinds of duties that are performed by a person in this occupation?

These student reactions are saved by the computer for purposes of reports that are prepared for him at a later time. On the basis of his experience, the student can either go on and analyze the occupation in more detail or he can select another occupation

Let's assume he decides to go on with the same occupation
He now learns about:

1. The educational requirements
2. Working conditions
3. Growth potential
4. Salaries, and other important facts

If he thinks he may not be able to satisfy the educational requirements, the film image projector lists typical reasons such as poor grades, military service, too long, etc.; and he is asked to name his reason. If he says "poor grades" the computer retrieves his scholastic record and prints a message about the validity of his concern based upon the past history of students in his school with similar grades. The high school courses which are required for this occupation as well as suggested electives are printed out for him. If he has taken any of these courses, the typewriter prints his grade received, and can warn him if his grades are low.

Throughout the analysis of an occupation the system:

Compares his present reactions to those of similar occupations that he had analyzed earlier. For example, when he reads about the working conditions for an occupation he must indicate to the computer whether he thinks he would like the working conditions. The computer scans back to see how he responded to occupations with similar working conditions and prints messages for him about consistencies or inconsistencies in his response pattern.

(Slide # 12- Flow Chart: Detailed Analysis of Occupation Continued)

After the student completes an analysis of each occupation, the typewriter prints a summary for him. The summary includes:

a. Narrative description of his reactions to various factors about the occupation.

b. Statements which alert the student to potential problems he may encounter if he considers this occupation as a career goal. These statements focus on differences between the usual requirements for the occupation and the student's self-concept, his measured learning ability, his inventories interests or his school grade point average.

(Slide # 13- Print-out of Occupational Analysis)

Here is an example of one kind of typewriter message the student receives at the end of an analysis of an occupation. The "X" indicates a potential problem area.

If such problem areas are brought to the student's attention, he is advised to see his counselor to learn how he may overcome potential obstacles if he is serious about planning for the occupation. In this slide, the printed report is cautioning the student that his measured interests are low for the field in which this occupation is classified.

(Slide # 14- Flow Chart: Major Areas of Study)

Now let's assume that we have another kind of student who is not able to express himself in terms of vocational goals but finds it more comfortab to express himself in terms of curriculum preferences for post-high school education or this may be a student who has worked through the vocational orientation phase and now wishes to follow through into the educational orientation phase.

The student may name the kinds of major areas of study that appeal to him. He does this by exploring with the aid of the system the curriculum programs and the kinds of courses that are offered in junior colleges and technical schools and four year universities. Having expressed his areas of curriculum interest, the typewriter printer suggests to the student other related areas of study which could be of interest to him.

(Slide #15- Print-out of Suggested Majors)

Here is an example of some recommendations made by the computer to help a student explore post high school major areas of study. This student explored "Journalism" and "Veterinary Medicine". The system suggested some related areas for him to investigate if he wishes. The system also makes relationships between his vocational explorations and educational explorations so that he may estimate how well his preferred major areas of study support his vocational preferences.

(Slide # 16- Print-out of Occupations and Majors)

Here is an example of a print-out which helps show the student the relationship between:

Occupations he explored
Majors he explored

In this example, the student is reminded that he said he was interested in occupations in the General Culture Field which required a college education but that he did not look at supporting major areas of study.

(Slide # 17- College Search Flow Chart)

At this point, the student can enter into a search for a junior college or a university that will satisfy his curriculum goals.
He indicated these goals to the system and, in addition, indicates to the system his personal preferences for:

1. The type of school in terms of whether it is a state university, private university, all male, all female or coeducational student body.
2. Geographical locations.
3. Size of the school.
4. Preferred major area of study.

Based on this information, the system isolates for the students the names of the colleges that satisfy his requirements.

The system also supplied the student with key data about each one of these colleges such as:

1. Degree of selectivity of the college which the student can relate to his college acceptance examinations and his scholastic standing in his class.
2. Tuition and living costs.
3. Whether or not dormitory residences are availale on campus.
4. Religious affiliations.

(Slide # 18- Print-out of Colleges)

Here is an example of a list of schools that the typewriter has printed out for a student who said he wanted to study " Political Science " in a school located in north eastern United States, and which had to be of " medium size". This list of colleges is intended to be a work sheet which is to be taken home by the student and reviewed with his

parents and counselor in order to decide upon colleges. The student can have included in this list the names and data for any schools which are of special interest to him.

CONCLUSION

By field testing such new systems in schools and then modifying them based upon findings, it is expected that they can provide advantages to the student, the counselor and the school.

The student should be able to sharpen his focus on goals, thereby making his high school course selection and curriculum more meaningful to him. His educational and vocational planning generally should be more efficient, thereby reducing the number of time-consuming and costly false starts.

The system could enable the counselor to work at a higher level of individualized and diagnostic problem solving with each student, since the students would be more prepared to deal with personal problems of educational and vocational planning. The counselor also should be able to devote more of his time to professional counseling activities and less time to maintaining and operating an educational-occupational information library.

On the basis of the field test findings in Montclair High School, improvements are being made in the ECES System. Plans are being made to field test the revised system in the Genessee Intermediate School District in Flint, Michigan. The field test will start this November and will last for one year and will involve 4,800 students from 21 high schools.

I would now like to show you a movie which demonstrates how students use the system. The film was prepared for our field test and was used as part of the student orientation program in order to make the

students familiar with the purpose of the system. We also used the film as part of a community orientation program for parents and interested visitors. Some of the messages which are flashed on the screen will only be seen briefly; we didn't intend for you to read them but just scan some of the titles..... we will now show the film.